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IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Patent Application

Inventors(s):	Jurgen Gripp Martin Zirngibl	**Case:**	2-35
Serial No.:	09/648,822	**Filing Date:**	August 25, 2000
Examiner:	David C. Payne	**Group Art Unit:**	2633
Title:	Optical Router		

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ALEXANDRIA, VA 22313

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Respectfully,

By Michael Urbano

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610-691-7710

Date: 09/21/04

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Michael J. Urbano Michael Urbano

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THE COMMISSIONER OF PATENTS AND TRADEMARKS
WASHINGTON, DC 20231

SIR:

APPEAL BRIEF UNDER 37 CFR § 1.192

I. Real Party In Interest

The real party in interest is Lucent Technologies Inc., 600 Mountain Avenue, PO Box 636, Murray Hill, NJ, 07974-0636.

II. Related Appeals and Interferences

There are no related appeals or interferences.

III. Status of the Claims

Claims Extant: Claims 1-27 are now in this case.

Claims Rejected: Claims 1-5 and 21-27 stand finally rejected. More specifically, claims 1-4 and 21-27 have been rejected under 35 USC §103(a) as being unpatentable over Kaminow *et al.* [US Patent No. 5,623,356 (hereinafter *Kaminow*)] in view of Glance *et al.* [US Patent No. 5,455,699 (hereinafter *Glance*)]. Claim 5 has been rejected under 35 USC §103(a) as being unpatentable over Kaminow and Glance further in view of Wang *et al.* [US Patent No. 5,745,612 (hereinafter *Wang*)] and has been rejected under 35

USC §103(a) as being unpatentable over Kaminow and Glance further in view of Brock *et al.* [US Patent No. 5,870,216 (hereinafter *Brock*)].

Claims Allowable: Claims 6-8 have been objected to as being dependent upon rejected base claim 1, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 9-20 have been allowed

Claims on Appeal: Claims 1-5 and 21-27 are on appeal.

IV. Status of Amendments

Applicants filed a response to the Final rejection, but that response contained no amendments to the specification or claims. There are no outstanding amendments that have not been entered.

V. Summary of the Invention

In accordance with one aspect of the invention, as set forth in claim 1, a dynamic optical router (e.g., 10) utilizes a uniquely designed frequency router (e.g., 20) to route optical signals to a plurality of output channels (e.g., 38, 40, 42, 44). The frequency router (e.g., 20) has a plurality of input ports (e.g., 22, 24) and a plurality of output ports (e.g., 26, 28), characterized in that:

(1) each optical signal contains destination information,

(2) at least one input port simultaneously receives at least two optical signals (e.g., λ_{1a}, λ_{2a}) to be frequency routed,

(3) at least one output port simultaneously presents at least two frequency routed optical signals (e.g., λ_{1a}, λ_{2b}), and

(4) at least one output port (e.g., 26) couples routed optical signals to a plurality of output channels (e.g., 38, 40),

(5) wherein each optical signal to be frequency routed is dynamically tuned to a particular color in response to its destination information.

In accordance with another aspect of our invention, independent claims 21, 22 and

25, set forth a corresponding method of routing a plurality of optical signals to a plurality of output channels.

VI. Issues Presented for Review

Issue A: Whether Claims 1-4 and 21-27 are patentable over Kaminow and Glance under 35 USC §103(a).

Issue B: Whether Claim 5 is patentable over Kaminow, Glance and Wang under 35 USC §103(a).

Issue C: Whether Claim 5 is patentable over Kaminow, Glance and Brock under 35 USC §103(a).

VII. Grouping of Claims

Claims 1-5 are in a first group.

Claim 21 is in a second group.

Claims 22-24 are in a third group.

Claims 25-27 are in a fourth group.

In each group the Claims do *not* stand or fall together. As indicated in Section VIII, Argument, *infra*, the Claims of each group are believed to be separately patentable.

VIII. Argument

ISSUE A: WHETHER CLAIMS 1-4 and 21-27 ARE PATENTABLE OVER KAMINOW AND GLANCE UNDER 35 USC §103(a).

In paragraph 3 of the first Office action of September 10, 2003 and in paragraph 2 of the final Office action of March 24, 2004, claims 1-4 and 21-27 have been rejected under 35 USC 103(a) as being unpatentable over Kaminow in view of Glance . The Examiner states his position as follows. (For clarity each of the Examiner's assertions have been listed as separately numbered statements.)

Re claims(s) 1, 3, 22, 24, 25 and 27 Kaminow disclosed,

(1) An optical router comprising
(2) at least one frequency router (Figure 1) having a plurality of input ports ($101_1 - 101_N$) and a plurality of output ports ($127_1 - 127_N$),
(3) at least one input port simultaneously receives at least two optical signals to be frequency routed (e.g., col./line(s): 2/55-60), and
(4) at least one output port simultaneously presenting at least two frequency routed optical signals (e.g., col./line(s): 3/60-65),
(5) Kaminow did not disclose wherein each optical signal to be frequency routed is colored in response to destination information.
(6) Glance disclosed a frequency router where each optical signal to be frequency routed is colored in response to destination information (e.g., col./line(s): 2/44-47, 3/45-50).
(7) It would have been obvious...[to] route according to destination for the benefit [of] building a large-capacity packet network that are (*sic*) optically transparent between input and output ports as disclosed by Glance (see e.g., col./line(s): 1/20-25).

The Examiner's argument suggests that the only difference between Kaminow and Applicants' invention is that Kaminow fails to disclose that each optical signal to be frequency routed is colored in response to destination information (statement 5, above). In addition, the Examiner suggests that Glance supplies this deficiency (statements 6-7, above).

Issue A: Claim 1

To the contrary, however, claim 1 specifically requires three things: (1) lines 4-6: at least one input port (e.g., 22) of frequency router 20 *simultaneously* receives *at least two* optical signals (e.g., λ_{1a} and λ_{2a}) to be frequency routed, (2) lines 6-7: at least one output port (e.g., 26) *simultaneously* presents *at least two* frequency routed optical signals (e.g., λ_{1a} and λ_{2b}), and (3) lines 7-8: at least one output port (e.g., 26) couples routed optical signals to a plurality of output channels (e.g., 38 and 40). In contrast, in Kaminow, and in the combination of Kaminow and Glance, Applicants' type of frequency router, in which at least two optical signals are simultaneously received at an input port and simultaneously presented at an output port, is not even remotely suggested. More specifically, in Kaminow each input port of the wavelength router (FIG. 2, wavelength router 202; col. 4, lines 47-48) receives only a *single* optical signal. Likewise, the wavelength switches 111, which contain wavelength routers 202, receive

single optical signals on each input port and transmit *single* optical signals at each output port. In no case does Kaminow show, teach or reasonably suggest that more than one optical signal is simultaneously received by any input port of wavelength router 202. Likewise, in Kaminow each output port of wavelength router 202 presents only a *single* optical signal. In no case does Kaminow show, teach or reasonably suggest that more than one optical signal is simultaneously presented by any output port of wavelength router 202.

Thus, the Kaminow frequency router is essentially made of N wavelength switches 111_N in combination with N space switches 117_N, but, as discussed earlier, at least two of the router inputs (at 107_N) and at least two of the outputs (at 117_N) are not received or presented by the router simultaneously.

In addition, in Kaminow the N WDM signals on input links 101_N in combination with 1 x F Demuxes 105_N do not perform any routing function. Rather, they merely disaggregate WDM traffic coming from the network into separate signals 107_F. Specifically, the wavelengths of the signals on links 101_N are not dynamically tuned in response to destination information, contrary to claim 1, lines 9-10.

Similarly, in the combination of Kaminow and Glance, the only modification of Kaminow suggested by the Examiner is to route Kaminow's packets according to destination information as taught by Glance. But, even if this modification is assumed to be proper, the combination of Kaminow and Glance would not rectify the deficiencies of Kaminow noted above.

First, this conclusion is buttressed by the fact that the frequency router 1 of Glance (FIG. 1) also receives a *single* optical signal at each of its input ports and delivers a *single* optical signal at each of its output ports. See, also, col. 1, lines 65-67 where Glance suggests that his architecture utilizes *a single optical receiver per output port* and col. 2, lines 46-49 where Glance states that *contention... is resolved by allowing one packet at a time to access to the exit fiber*.

Second, the section of Glance cited by the Examiner must be carefully read: col. 2, lines 44-46 state the following:

> The packets are routed by the frequency router according to their wavelengths, with each source using a different wavelength to access a given destination.

Notice that the first clause of the above-quoted sentence of Glance says that packets are routed *according to their wavelengths*; it does *not* say, however, that packets are routed according to *destination information contained within the packets*, as required by Applicants' claim 1. Moreover, the second clause of the above-quoted sentence corroborates this conclusion by correlating wavelength with destination, but it does *not* explain *where the destination information is located.*

Accordingly, it is respectfully submitted that claim 1 is not rendered obvious by the proposed combination of Kaminow and Glance.

Issue A: Claim 2

On the other hand, claim 2, which depends from claim 1, is patentable over the proposed combination of Kaminow and Glance not only by virtue of its dependence from claim 1 for the reasons discussed above, but also because this claim does not call for general combiners and receivers, but rather calls for specific devices that operate to combine/separate *the at least two routed optical signals*. Since the antecedent for these signals is the at least two signals simultaneously received by an input port, and presented by an output port, of the frequency router, it should be clear that any combiners and the receivers of the Kaminow-Glance combination would not be designed to combine/receive at least two signals simultaneously, as required by claim 2.

Issue A: Claim 4

Claim 4, which depends from claims 1, 2 and 3, is patentable over the proposed

combination of Kaminow and Glance for the reasons set forth above in conjunction with claims 1-2 and incorporated herein by reference, but also because it specifically calls for a converter to be coupled to each combiner in order to color at least one data packet in accordance with destination information. This combiner-converter combination is not reasonably suggested by the cited prior art.

Issue A: Claims 21-27

In a similar fashion independent method claims 21, 22 and 25 are patentably distinguishable over the proposed combination of Kaminow and Glance. More specifically, each of these method claims requires that at least two optical signals to be routed are simultaneously received at an input port of a frequency router and at least two routed optical signals are simultaneously presented at an output port of the frequency router. See, claim 21, lines 13-18; claim 22, lines 5-11; and claim 25, lines 7-11. Accordingly, for the reasons set forth for claim 1, above, claims 21, 22 and 25 are not rendered obvious by the combination of Kaminow and Glance.

On the other hand, dependent method claims 23 and 26 are patentable not only by virtue of its dependence from independent claims 22 and 25, respectively, but also because claim 23 specifically requires that each of the at least two signals presented at an output port of the frequency router be further *processed* (*removed*, in the case of claim 26). First, the combination of Kaminow and Glance fails to present two signals simultaneously/concurrently at an output port of the frequency router for the reasons set forth above and incorporated herein by reference, and moreover the combination of these references does not further process the *simultaneously* (*concurrently*, in the case of claim 26) presented signals.

Likewise, dependent method claims 24 and 27 are patentable not only by virtue of their dependence from independent claims 22 and 25, respectively, but also because claims 24 and 26 specifically require that each optical signal is colored, not only as a function of destination information, but also as a further function of which input port it is

applied to. This feature is not even remotely suggested by the proposed combination of Kaminow and Glance.

Accordingly, it is respectfully submitted that method claims 21-27 are not rendered obvious by the proposed combination of Kaminow and Glance.

Issue A: Examiner's Response to Applicants' Arguments – Claims 1, 2, 21, 22, 25

In paragraph 1 at page 2 of the final Office action of March 24, 2004 the Examiner indicates that Applicants' arguments of December 10, 2003 were "fully considered but...not persuasive." (The substance of the arguments is actually found above and in Applicants' original response of November 29, 2003.) In support of this conclusion, the Examiner states his position as follows in paragraph 2 at pages 2-3. (For clarity paragraph 2 has been separated into four separately numbered statements.)

> (1) (Claims 1, 2, 21, 22 and 25) Regarding applicant's claim that Kaminov (*sic*) does not teach where an input port of the ***frequency router*** simultaneously receives at least two optical signals and at least one output port simultaneously presents at least two frequency routed signals.
>
> (2) Apparently, the applicant has interpreted the Kaminov (*sic*) teachings more narrowly than the examiner. Applicant has chosen a router, which is a sub-component of the wavelength/switch router disclosed by Kaminov (*sic*).
>
> (3) However, Kaminov (*sic*) describes the entire apparatus (100 of Figure 1) as a wavelength/router switch (see col. 3, lines 39-41). Again, Kaminov (*sic*) disclosed the wavelength/router switch including an array of N optical signal wavelength-domain or wavelength-sensitive demultiplexers each of which includes an input and s (*sic*) set of F output ports (see col. 1, lines 45-50). So the WDM input ports (101 of figure 1) are input ports to the apparatus or router.
>
> (4) Thus, the apparatus as a whole should be interpreted as the "router" not the component wavelength switches (111 of Figure 1). As such it is clear that input ports 101n (*sic*) and output ports 127n (*sic*) simultaneously receive/present one or more wavelengths. (Emphasis added)

Statements (1) and (2) suggest that Applicants have interpreted Kaminow more narrowly than the Examiner. On the other hand, Applicants' respectfully submit that the Examiner's impliedly broader interpretation set forth in statements (3) and (4) is

consistent neither with the technology of such systems nor with Applicants' claims. The key to understanding how Applicants' invention, as defined by claims 1, 2, 21, 22 and 25, is patentably distinguishable from Kaminow (as well as the proposed combination of Kaminow and Glance) is to recognize how they are similar and how they are different.

First, in the context of the optical switching systems art, they are similar because Applicants' invention and Kaminow both comprise an overall optical apparatus designated as a ***router*** that includes a component designated as a ***frequency*** (or wavelength) router. More specifically, Kaminow identifies his overall router 100 (FIG. 1) as a "wavelength router/switch" (e.g., col. 2, line 47) and identifies his component 202 (FIG. 2) as a "wavelength router" (col. 4, lines 46-48). Likewise, Applicants identify their overall apparatus as a "dynamic optical router" (e.g., claim 1, line 1; FIG. 1, router 10) that includes a component designated as a "frequency router" (e.g., claim 1, line 2; FIG. 1, frequency router 20).

Thus, when comparing Applicants' claim 1, for example, with Kaminow, the logic of this parallelism must be retained so that the examination process does not do a gross injustice to Applicants by distorting how these system configurations are viewed and accepted in the art. That is, Kaminow's router 100 should be compared to Applicants' "dynamic optical router" (e.g., claim 1, line 1) and Kaminow's wavelength router 202 should be compared to Applicants' "frequency router" (e.g., claim 1, lines 2-10).

When this comparison if fairly made, it is clear how Kaminow is different from Applicants invention. Claim 1, for example, requires that "at least one input port [of the frequency router] simultaneously receives at least two optical signals to be frequency routed" (e.g., FIG. 1, λ_{1a} and λ_{2a} are simultaneously received at input port 22), whereas in Kaminow (and in the Kaminow-Glance combination) wavelength (frequency) router 202 receives only one optical signal at each of its input ports. Likewise, claim 1, for example, requires that "at least one output port [of the frequency router] simultaneously presents at

least two frequency routed optical signals" (e.g., FIG. 1, λ_{1a} and λ_{2b} are simultaneously presented at output port 26), whereas in Kaminow (and in the Kaminow-Glance combination) wavelength (frequency) router 202 each output port 113 presents only one optical signal.

Simply put, Kaminow (and the Kaminow-Glance combination) does not teach one skilled in the art that a ***frequency*** router embedded in a larger routing/switching apparatus has the simultaneous signal features of, for example, claim 1 and accordingly does not provide the public with Applicants' significant contribution to this art - a topology that enables the realization of large scale optical routers.

The foregoing arguments apply equally to claims 2, 21, 22 and 25. In addition, however, claim 2 requires a plurality of combiners (e.g., FIG. 2, PCs 118) that operate on "the at least two optical signals." The antecedent for these signals is, of course, the simultaneously received signals discussed above with regard to claim 1. An embedded frequency router with these types of signals received is neither taught nor reasonably suggested by Kaminow (and the Kaminow-Glance combination), and consequently it must follow that the combiner of Kaminow (e.g., FIG. 2, combiner 203) does correspond to that set forth in claim 2, lines 2-3. Similar comments apply to the "plurality of receivers" limitation of claim 2, lines 4-6.

Issue A: Examiner's Response to Applicants' Arguments – Claim 4

In paragraph 3 of the final Office action, the Examiner makes the following assertion regarding claim 4, which depends from claim 2:

> Regarding applicant's (*sic*) claim that the converter/combiner coupling limitation of claim 4 is not reasonably suggested by the cited prior art. Figure 2 of Kaminov (*sic*) is very explicit in showing wavelength converters (201) coupled to Combiners (203). (emphasis added)

This rejection is improper for two reasons.

First, since claim 4 depends from claim 2, Applicants traverse for the reasons set forth above regarding claim 2 and incorporated herein by reference.

Second, the Examiner cannot have it both ways. If the Examiner insists that Kaminow's wavelength/frequency router constitutes the overall apparatus 100, then the simultaneous signals to this router would be designated 101_N according the Examiner's analysis. But no combiners exist at these inputs. That is, the combiners of Applicants' claims 2 & 4 impliedly precede the frequency router inasmuch as the combiners serve to combine the signals and apply the desired simultaneous signals to the frequency router's input ports (e.g., in Applicants' FIG. 3, PC 118_1 combines inputs $102_{1\text{-}M}$ and applies them simultaneously to input port 130_1 of frequency router AWG 120).

Third, if the Examiner insists that the relevant combiners are those designated 203 in Kaminow's FIG. 2, then he is ***per force*** agreeing with Applicants that the relevant frequency router to which Applicants' claims are to be compared is that designated 202, not the overall apparatus 100.

Issue A: Examiner's New Statements in Final Rejection

At pages 3-6 of the final Office action the Examiner repeated the Section 103 rejection of claims 1-5 and 21-27 that he set forth in the first Office action of September 10, 2003. In addition, the Examiner has made several new statements, which were not a part of the first Office action and which Applicants traversed as indicated below; to wit, at page 4, paragraph 2, of the final Office action, in the discussion of claims 1, 3, 22, 24, 25 and 27, the Examiner concludes incorrectly as follows. (For clarity the quoted portion of paragraph 2 has been separated into two separately numbered statements.)

> (1) Furthermore, the Glance router uses wavelength information to route to a destination, the Kaminov (***sic***) signal will ***in fact*** comprise destination information if using the Glance routing method ***by definition*** since the destination information is 'encoded' in the wavelength. (Emphasis added)
> (2) Finally, Glance disclosed a fast-tunable optical filter, which is used to route signals or 'dynamically tune to a particular color' (see col. 2/30-35).

Although Glance indicates that "packets are routed by the frequency router according to their wavelengths, with each source using a different wavelength to access a given destination," (col. 2, lines 44-46), Glance does not teach or reasonably suggest that either (i) "each optical signal contains destination information", as required, for example, by claim 1, line 4; or (ii) "each optical signal to be frequency routed is ***dynamically*** tuned to a particular color in response to its destination information." From a technology standpoint Applicants' invention employs ***dynamic*** tuning, whereas Glance does not. More specifically, Applicants' invention utilizes preexisting destination information in ***each packet*** to choose a wavelength that will route each signal to its particular destination properly. Unlike Glance, the wavelength of each of Applicants' signals is not itself the destination information but is derived from the destination information contained in each packet for the purposes of routing that packet.

Secondly, contrary to the Examiner's assertion, the optical filters 3 of Glance are not used to either route signals or dynamically tune them. Rather, each filter 3 "detects incoming packets and selects one of them when more than one packet tries to reach the same destination" (col. 2, lines 55-57). The other packets are blocked. This function does not constitute routing or tuning as those terms are used in the optical systems art.

ISSUE A: WHETHER CLAIM 5 IS PATENTABLE OVER KAMINOW, GLANCE AND WANG UNDER 35 USC §103(a).

In paragraph 4 of the first Office action of September 10, 2003 and in paragraph 3 of the final Office action of March 24, 2004, Claim 5 has been rejected under 35 USC 103(a) as being unpatentable over Kaminow and Glance as applied to claim 4 above, and further in view of Wang. This rejection is respectfully traversed. The Examiner states his position as follows. (For clarity each of the Examiner's assertions have been listed in separately numbered paragraphs.)

Re claim 5, Kaminow further disclosed

(1) at least one input waveguide (Figure 1#101_1);
(2) at least one output waveguide (Figure 1#101_N; *sic*, 127_N);
(3) a first (Figure 1#117_1) and a second free space region (Figure 1 #117_F), the first free space region coupled with the at least one input waveguide and the second free space region coupled with the at least one output waveguide (127).
(4) Kaminow and Glance do not disclose optical grating having a plurality of unequal length waveguides, each unequal length waveguide coupled between the first free space region and the second free space region.
(5) However, Wang (Figure 1) disclosed AWG (111 and 112) coupled in such a manner.
(6) It would be obvious ...to use Wang's AWGs for the benefit [of] removing on-chip waveguide crossing, overlapping) and therefore reducing signal loss (e.g., col./line(s): 2/64-67, 3/1-5)

Applicants' respectfully submit that claim 5 is patentable by virtue of its dependence from claims 1-4 for the reasons set forth above and incorporated herein by reference.

ISSUE A: WHETHER CLAIM 5 IS PATENTABLE OVER KAMINOW, GLANCE AND BROCK UNDER 35 USC §103(a).

In paragraph 5 of the first Office action of September 10, 2003 and in paragraph 4 of the final Office action of March 24, 2004, Claim 5 has been rejected under 35 USC 103(a) as being unpatentable over Kaminow and Glance as applied to claim 4 above, and further in view of Brock. This rejection is respectfully traversed. The Examiner states his position as follows. (For clarity each of the Examiner's assertions have been listed in separately numbered paragraphs.)

Re claim 5, Kaminow further disclosed
(1) at least one input waveguide (Figure 1#101_1);
(2) at least one output waveguide (Figure 1#101_N; *sic*, 127_N);
(3) a first (Figure 1#117_1) and a second free space region (Figure 1 #117_F), the first free space region coupled with the at least one input waveguide and the second free space region coupled with the at least one output waveguide (127).
(4) Kaminow and Glance do not disclose optical grating having a plurality of unequal length waveguides, each unequal length waveguide coupled between the first free space region and the second free space region.
(5) However, Brock (Figure 7) disclosed AWG (126 and 128) coupled in such a

manner.

(6) It would have been obvious...to use Brock's AWGs for the benefit [of] removing reducing signal loss associated with discrete components.

Applicants' respectfully submit that claim 5 is patentable by virtue of its dependence from claims 1-4 for the reasons set forth above and incorporated herein by reference.

IX. Conclusion

In summary, it is respectfully submitted that the art of record fails to render obvious Claims 1-5 and 21-27. Accordingly, reversal of the final rejection is in order.

X. Appendix

The claims under appeal are listed in Appendix A.

Respectfully,
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Martin Zirngibl

By Michael J. Urbano

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Date: 09/21/04

Att.
Appendix A

APPENDIX A

Claims on Appeal

1. A dynamic optical router for routing optical signals to a plurality of output channels, comprising at least one frequency router having a plurality of input ports and a plurality of output ports, each optical signal comprising destination information, at least one input port simultaneously receives at least two optical signals to be frequency routed, at least one output port simultaneously presents at least two frequency routed optical signals, and at least one output port couples routed optical signals to a plurality of output channels, wherein each optical signal to be frequency routed is dynamically tuned to a particular color in response to its destination information.

2. The optical router of Claim 1, further comprising:

a plurality of combiners, one combiner for combining the at least two optical signals to be routed; and

a plurality of receivers, one receiver for separating each of the at least two routed optical signals to intended destinations in response to destination information.

3. The optical router of Claim 2, wherein the frequency router routes optical signals by color, the at least two optical signals to be routed having different colors, and the at least two routed optical signals having different colors.

4. The optical router of Claim 3, wherein the optical router receives packets of data, each packet of data having destination information, each combiner coupled with at least

one converter of a plurality, each converter converting at least one packet of data to an optical signal colored in response to the destination information of the corresponding at least one packet of data.

5. The optical router of Claim 4, wherein the frequency router comprises:

at least one input waveguide;

at least one output waveguide;

a first and a second free space region, the first free space region coupled with the at least one input waveguide and the second free space region coupled with the at least one output waveguide; and

an optical grating having a plurality of unequal length waveguides, each unequal length waveguide coupled between the first free space region and the second free space region.

21. A method for routing optical signals to a plurality of output channels comprising:

determining a first, second and third destination for a first, second and third packet of data, respectively;

generating a first, second and third carrier signal having a first, second and third frequency associated with the first, second and third destinations, respectively;

modulating the first, second and third carrier signals in response to the first, second and third packets of data to form a first, second and third optical signal; and

routing the first, second and third optical signals by a frequency routing device, the step of routing comprising:

simultaneously receiving in a first input of a frequency router at least two of the first, second and third signals;

simultaneously presenting from a first output of the frequency router at least two of the first, second and third routed optical signals; and coupling routed optical signals from at least one output port to a plurality of output channels.

22. A method for routing a plurality of optical signals to a plurality of output channels as a function of color through a router having a plurality of input ports and a plurality of output ports, the method comprising the steps of:

simultaneously receiving at at least one of the input ports at least two optical signals respectively colored as a function of destination information contained therein;

simultaneously presenting to at least one of the output ports at least two optical signals routed as a function of their color; and coupling routed optical signals from at least one output port to a plurality of output channels.

23. The method of claim 22, after the presenting step further comprising the step of processing each of the presented at least two routed optical signals from the at least one of the output ports.

24. The method of claim 22, further comprising the step of coloring each optical signal of the plurality as a further function of which input port of the plurality of input ports it is applied to.

25. A method for use in conjunction with a router which has a plurality of input ports and plurality of output ports, said router being of a type which routes optical signals applied to its input ports to particular ones of said output ports as a function of the respective colors of said optical signals, the method:

applying each of a plurality of optical signals to a respective one of the input ports, this including the step of concurrently applying to an individual one of said input ports at least two optical signals which have been respectively colored as a function of destination information contained in said optical signals, at least two of said optical signals being concurrently routed to a particular one of said output ports.

26. The invention of claim 25, comprising the further step of concurrently removing from said particular one of said output ports said two optical signals concurrently routed thereto.

27. The invention of claim 25, wherein the coloring of each said optical signal is a further function of which input port it is applied to.